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10/632,750

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First Named Inventor

TAKATA, Yutaka

Art Unit

2818

Examiner Name

Unassigned

Attorney Docket Number

16869K-086100US

**ENCLOSURES (Check all that apply)**

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|---|---|---|
| <input type="checkbox"/> Fee Transmittal Form                             | <input type="checkbox"/> Drawing(s)   | <input type="checkbox"/> After Allowance Communication to TC                            |
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**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

Firm Name

Townsend and Townsend and Crew LLP

Signature

Printed name

Chun-Pok Leung

Date

September 26, 2005

Reg. No.

41,405

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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

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Date

September 26, 2005



PATENT  
Attorney Docket No.: 16869K-086100US  
Client Ref. No.: 632/SM

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

YUTAKA TAKATA et al.

Application No.: 10/632,750

Filed: August 1, 2003

For: DISK CONTROLLER AND  
CONTROLLING METHOD OF  
THE SAME

Customer No.: 20350

Examiner: Unassigned

Technology Center/Art Unit: Unassigned

Confirmation No.: 4662

**RENEWED PETITION TO MAKE  
SPECIAL FOR NEW APPLICATION  
UNDER M.P.E.P. § 708.02, VIII & 37  
C.F.R. § 1.102(d)**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Decision dated August 27, 2005 dismissing the original petition to make special, Applicants respectfully submit a renewed petition to make special the above-identified application under MPEP § 708.02, VIII & 37 C.F.R. § 1.102(d). The application has not received any examination by an Examiner.

(a) The Commissioner has previously been authorized to charge the petition fee of \$130 under 37 C.F.R. § 1.17(i) and any other fees associated with this paper to Deposit Account 20-1430.

(b) All the claims are believed to be directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then Applicants will make an election without traverse as a prerequisite to the grant of special status.

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(c) Pre-examination searches were made of U.S. issued patents, including a classification search, a computer database search, and a keyword search. The searches were performed on or around July 12, 2004. The classification search covered Class 710 (subclass 6), Class 711 (subclasses 162 and 170), and Class 714 (subclass 2), and was conducted by a professional search firm, Kramer & Amado, P.C. The computer database search was conducted on the USPTO systems EAST and WEST. The keyword search was conducted in Classes 709 (subclasses 203, 218, 223, and 226), 711 (subclass 112), and 714 (subclasses 5 and 6). The inventors further provided references considered most closely related to the subject matter of the present application (see references #6-11 below), which were cited in the Information Disclosure Statement filed with the application on August 1, 2003.

(d) The following references, copies of which were previously submitted, are deemed most closely related to the subject matter encompassed by the claims:

- (1) U.S. Patent No. 5,768,623;
- (2) U.S. Patent No. 6,449,607 B1;
- (3) U.S. Patent Publication No. 2002/0178336 A1;
- (4) U.S. Patent Publication No. 2003/0105767 A1;
- (5) U.S. Patent Publication No. 2004/0098543 A1;
- (6) Japanese Patent Publication No. 2000-047952;
- (7) Japanese Patent Publication No. 06-332782;
- (8) Japanese Patent Publication No. 2002-163140;
- (9) Japanese Patent Publication No. 2001-051890;
- (10) Japanese Patent Publication No. 2000-207370; and
- (11) Japanese Patent Publication No. 08-335144.

(e) Set forth below is a detailed discussion of references which points out with particularity how the claimed subject matter is distinguishable over the references.

A. Claimed Embodiments of the Present Invention

The claimed embodiments relate to a disk controller and a method of controlling the same to provide high performance. The disc controlling unit is formed in the

same circuit board in which the network controlling unit is formed, and couples the network controlling unit thereto by an internal bus provided in the circuit board. Thus, the network controlling unit and the disc controlling unit can execute a highly flexible transmission to each other without restriction due to difference in protocol.

Independent claim 1 recites a disc controller comprising a network controlling unit configured to receive a data input/output request sent from an external device through a network; and a disc controlling unit formed in the same circuit board in which the network controlling unit is formed, the disc controlling unit coupled to the network controlling unit by an internal bus provided in the circuit board. The disc controlling unit is configured to receive a command sent from the network controlling unit through the internal bus and executes a data input/output for a disc drive in response to the command. The network controlling unit is configured to send the command, for which a plurality of addresses are set, to the disc controlling unit. The disc controlling unit is configured to receive the command and executes data input/output corresponding to each of the addresses set in the command for the disc drive.

Independent claim 13 recites a disc controller comprising a network controlling unit configured to receive a data input/output request sent through a network; and a disc controlling unit formed in the same circuit board in which the network controlling unit is formed, the disc controlling unit being coupled to the network controlling unit by an internal bus provided in the circuit board, receiving a command sent from the network controlling unit through the internal bus, and inputting/outputting data to/from a disc drive in response to the command. The plurality of circuit boards connected so as to be capable of communicating with each other are provided. An occurrence of faults of one of the circuit boards is detected by one of the other circuit boards by exchanging a heartbeat message among the circuit boards. When the occurrence of the faults of one circuit board is detected by one of the other circuit boards, the circuit board different from the circuit board causing the faults substitutes for a processing of the circuit board causing the faults.

Independent claim 14 recites a controlling method of a disc controller having a network controlling unit configured to receive a data input/output request sent from an external device through a network; and a disc controlling unit formed in the same circuit board in which the network controlling unit is formed. The disc controlling unit is connected to the network controlling unit by an internal bus provided in the circuit board, receives a command sent from the network controlling unit through the internal bus, and inputs/outputs data to/from a disc drive in response to the command. The method comprises, by means of the network controlling unit sending one command, for which a plurality of addresses are set, to the disc controlling unit; and by means of the disc controlling unit receiving the command and executing data input/output corresponding to each of the addresses set in this command for the disc drive.

One of the benefits that may be derived is the high speed and high reliability with which the processing of the disk controller can be performed.

B. Discussion of the References

1. U.S. Patent No. 5,768,623

This reference discloses an architecture which uses host adapter cards that can reside in the host and can control numerous arrays. A plurality of adapter cards is used. Each adapter has controller functions for a designated storage array. There is a host application interface between an application program running in the host computer 20 and the adapter 22. When a data request is made by an application program to a first adapter A through a host application interface for data that is stored in a storage array not primarily controlled by the first adapter, the data request is communicated through the adapter communication interface 23 to the adapter B primarily controlling the storage array in which the requested data is stored. See column 2, line 45 to column 3, line 30; column 3, line 57 to column 4, line 27.

The reference provides an adapter communication interface between adapter A and adapter B for a data request. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit

is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

2. U.S. Patent No. 6,449,607 B1

This reference discloses a disk storage device 100 having a modifiable data management function. The disk storage device is connected to an interface 105 which connects to a network 110. A processor 103 carries out an object management program 350 for converting a control command containing physical address information of the disk storage medium 101 and feeds the converted control command to the disk controller 102. In response to an object management modification request given by the user through the network 110 and the network interface 105, the processor 103 carries out the object management modification program 320 to modify a function of the object management program 350. See column 2, lines 32-65; column 4, lines 18-39.

The reference provides a network and a network interface through which control command is communicated between the processor and the disk controller. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

3. U.S. Patent Publication No. 2002/0178336 A1

This reference discloses a storage subsystem capable of effecting remote copy of write data among a group of storage subsystems without being affected by an increase in the load of data writing by a specific host computer among a plurality of host computers connected to the storage subsystems. The storage subsystem includes a first storage subsystem 1 connected to a plurality of host computers 3 via a first interface 2 and a second

storage subsystem 7 connected to the first storage subsystem 1 via a second interface 6 so as to copy write data written in the first storage subsystem from the host computer onto the second storage subsystem from the first storage subsystem, thereby protecting the write data in the first and the second storage subsystems in a multiplex manner. See Figure 1 and [0016]-[0026].

The reference provides a first interface between a first storage subsystem and host computers and a second interface between the first storage subsystem and a second storage subsystem for data transfer. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

4. U.S. Patent Publication No. 2003/0105767 A1

This reference discloses a method for interfacing of SAN (Storage Area Networks) and NAS (Network Attached Storage), and prevents data miss even when a trouble occurs, and makes it possible that an arbitrary number of NAS interfaces access the same file system with high performance. The storage subsystem 100 includes a plurality of interfaces (110, 120, 130, 140, and 150) for the connection to the external network (600 and 700), a plurality of disks 171 to which the plurality of interfaces are accessible, and a shared memory 180 to which the plurality of interfaces are accessible, wherein the plurality of interfaces are loaded with one of the block interfaces for executing an I/O request in disk blocks, and file interfaces are loaded with file servers for executing an I/O request in files. See Figure 1 and [0016]-[0021].

The reference provides a plurality of interfaces (between an external network and disks) loaded with one of the block interfaces for executing an I/O request in disk blocks and file interfaces loaded with file servers for executing an I/O request in files. It does not teach a disc controlling unit formed in the same circuit board in which the network

controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

5. U.S. Patent Publication No. 2004/0098543 A1

This reference relates to a storage subsystem which is capable of performing exclusive control of input/output processing requests without need for imparting to the host processing system. The storage subsystem is comprised of a control unit 12 incorporating a control memory 124, wherein information concerning the extent (range) of an input/output processing request which is transferred from a given one of plural host processors to the control unit upon issuance of the input/output processing request from the former is stored in the control memory with a view to realizing the exclusive control for a plurality of input/output processing requests issues from a plurality of host processors to one logical device. A host adaptor 122 and a disk adaptor 123 are provided for data transfer between a host processor 10 and a storage unit 14. See [0001], [0006]-[0007] and [0024-0027].

The reference provides a host adaptor and a disk adaptor for communication between a host processor and a storage unit for data transfer. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

6. Japanese Patent Publication No. 2000-047952

This reference discloses a means of efficiently performing I/O processing while minimizing the use of processor, main storage, and system bus resources of a server computer by directly transferring data between a network card and an I/O device such as a network adapter or disk controller. In the network file server system, in processing a remote



file system request by a network card, data is directly transferred between a disk controller and the network card. The number of times the data transfer uses main memory between the disk controller and network card is decreased so that high speed processing is enabled.

The reference disclosing directly transferring data between a network card and an I/O device such as a disk controller. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

7. Japanese Patent Publication No. 06-332782

This reference discloses a technique to prevent the throughput due to the centralization of access requests in a specified file server from plural clients, in a file server system where plural file servers accessing each file storage devices are arranged side by side via a network. The master file server provides a file control means by using a load information table to measure and control the load status of each file server, and a file attribute table that records and controls the file server in charge of access to every file block, selecting a file server where the load is light at the time of writing a file.

The reference discloses a master file server providing a file control means to control a file server from a plurality of file servers for accessing file storage devices. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

8. Japanese Patent Publication No. 2002-163140

This reference discloses a storage system that has a scalability capable of fully coping with the band expansion of a network at a low cost. The storage system is comprised of a storage device capable of storing file data, a plurality of file servers performing file processes in response to requests on file data to the storage device 17, and a file server management node 11 managing the transfer processes of the file requests received from clients via an external network 3 to the file servers 12-i. An internal network 14 connects the response processes to the clients 2 for the file requests, the storage device 17, the file servers 12-i, and the file server management node 11.

The reference discloses a file server managing the transfer processes of file requests from clients via an external network to the file servers. Although the reference shows an internal network that connects the file servers, and file server management node, and the storage devices, it does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

9. Japanese Patent Publication No. 2001-051890

This reference discloses a decentralized file server system. The system is equipped with servers decentralized in the network and a virtual decentralized file system mounted on each of the servers. Modules judge whether or not their servers are optimum servers capable of handling requests according to server information holding parts, holding mapping tables between the virtual decentralized file system, all the local file systems, and the server information on all the servers.

The reference provides servers decentralized in the network and a virtual decentralized file system mounted on each of the servers. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein

the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

10. Japanese Patent Publication No. 2000-207370

This reference discloses a technique to provide a distributed file management system which can make appropriate load distribution by means of plural server computers for generating, referring to, and updating files. The distributed file management system is comprised of server computers, client computer groups, and a network. The server computer contains a storage device which records partial files, a network interface, a partial file management section which controls the write and read of the partial files, a status management section which holds load information, and a distributed file management section.

The reference provides a server computer having a network interface for interfacing with a network and a partial file management section for controlling the write and read of partial files in a storage device. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

11. Japanese Patent Publication No. 08-335144

This reference discloses a technique to improve reliability and performance of an external storage device, and to provide non-stop maintenance by distributing a load to the plural storage controllers of redundant configuration. Plural disk drive controllers of redundant configuration for controlling a disk device are connected to a host device by the same SCSI ID. These controllers monitor the mutual operating states and set the load distribution information by interposing a communication mechanism and a common

managing table in a normal state. High performance is provided by distributing the load by simultaneously operating the plural disk drive controllers, but in case of fault or maintenance, non-stop operation and non-stop maintenance are provided by executing a switching operation at the degeneracy, and recovery can be achieved by disconnecting on the side of the fault.

The reference provides a communication mechanism for disk drive controllers for controlling a disk device. It does not teach a disc controlling unit formed in the same circuit board in which the network controlling unit is formed wherein the disc controlling unit is coupled to the network controlling unit by an internal bus provided in the circuit board; nor does it teach that the disc controlling unit receives a command from the network controlling unit through the internal bus and executes data input/output for a disc drive, as recited in independent claims 1, 13, and 14.

(f) In view of this petition, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,



Chun-Pok Leung  
Reg. No. 41,405

TOWNSEND and TOWNSEND and CREW LLP  
Two Embarcadero Center, 8<sup>th</sup> Floor  
San Francisco, California 94111-3834  
Tel: 650-326-2400  
Fax: 415-576-0300  
RL:rl  
60591156 v1